

**UPPER SURFACE EMISSION TYPE SEMICONDUCTOR LIGHT EMITTING ELEMENT AND OPTICAL DETECTOR, OPTICAL INFORMATION PROCESSING DEVICE, AND LIGHT EMITTING DEVICE USING IT**

Patent Number: JP6045648  
Publication date: 1994-02-18  
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Requested Patent: ☐ JP6045648  
Application Number: JP19920218239 19920724  
Priority Number(s):  
IPC Classification: H01L33/00; B41J2/44; G06K7/10  
EC Classification:  
Equivalents:

**Abstract**

**PURPOSE:** To manufacture an upper surface emission type semiconductor light emitting element in a small light emission diameter with one crystal growth process by forming a current constitution layer with a different conductivity type according to the face orientation at the upper part of a formed substrate so that the inclined surface of a conical part is partially of a first conductivity type and of a second conductivity type at areas other the inclined surface.

**CONSTITUTION:** A P-type GaAs substrate 7 in (100) face orientation is etched by HF:H<sub>2</sub>O<sub>2</sub> for forming a square or triangular and conical shaped recess 9 and then an inclined surface 10 with (m11) A face orientation ( $1 < m < 5$ ) is exposed inside. Then, an Si doped AlGaAs current constriction layer 6, a Be doped AlGaAs clad layer 5, a GaAs activated layer 4, an Si doped AlGaAs clad layer 3, and an Sn doped GaAs contact layer 2 are continuously grown on the GaAs substrate 7 by MBE method. Therefore, an n-side electrode 1 is provided on it and a light emission window 11 is opened at a part opposing the center and a P-side electrode 8 is provided on the lower surface of the substrate 7, thus manufacturing a semiconductor light emitting element in a small light emission diameter.

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